

CLAIMS

What is claimed is:

1. A surgical instrument seal assembly for mounting to a cannula for the insertion of a surgical instrument, the seal assembly comprising:

- an upper body portion having an upper surface that defines a throughbore extending completely through the seal assembly;

- a lower body portion projecting below the upper body portion wherein the lower body portion defines a cannula receiving opening adapted to mount the seal assembly on the cannula; and

- a unitary valve seal comprising:

 - an upper seal portion having a mounting portion and a generally frusto-conical upper sealing member having a first taper extending from the mounting portion, wherein the mounting portion is rigidly mounted in the upper body portion adjacent an interior portion of the upper body portion, said interior portion opposing the upper surface, the upper seal portion being mounted about the throughbore, and

 - a lower seal portion extending from the upper seal portion, the lower seal portion being adapted to seal around the surgical instrument and having a generally frusto-conical lower sealing member having a second taper that is different from the first taper, the frusto-conical lower sealing member terminating in a distal lower seal end that defines an instrument seal opening.

2. A surgical instrument seal assembly according to claim 1 wherein the valve seal is formed from an elastomeric material.

3. A surgical instrument seal assembly according to claim 2 wherein the elastomeric material is selected from the group consisting of silicone, plastic elastomers, polyisoprene, butyl rubber, neoprene and natural rubber.

4. A surgical instrument seal assembly according to claim 1, further comprising a duckbill valve in the lower body portion.
5. A surgical instrument seal assembly according to claim 1 wherein the lower sealing member has a lower seal wall having an inner wall portion and an outer wall portion, a reinforcing layer being disposed intermediate the inner wall portion and the outer wall portion.
6. A surgical instrument seal assembly according to claim 5 wherein the reinforcing layer is integrally formed with at least a portion of the inner wall portion.
7. A surgical instrument seal assembly according to claim 1 wherein the generally frusto-conical lower sealing member has a lower seal wall terminating at the distal lower seal end, the lower seal wall being curved inward and defining a concave lower sealing member outer surface.
8. A surgical instrument seal assembly according to claim 1 wherein the throughbore is symmetrically formed around a bore axis and the upper sealing member defines an access opening adjacent the mounting portion that has a diameter larger than the throughbore, and wherein the valve seal is configured so that upon insertion of an instrument in an orientation not aligned with the bore axis, the distal lower seal end and the instrument seal opening will move radially relative to the bore axis and the access opening will remain substantially unmoved relative to the bore axis.
9. A valve seal for use in a surgical instrument seal assembly, the valve seal comprising:
 - an upper seal portion having a mounting portion and a generally frusto-conical upper sealing member having a first taper extending from the mounting portion; and
 - a lower seal portion extending from the upper seal portion, the lower seal portion being adapted to seal around a surgical instrument and having a generally frusto-conical lower sealing member having a second taper that is different from the first taper, the frusto-conical lower sealing member

terminating in a distal lower seal end that defines an instrument seal opening.

10. A valve seal according to claim 9 wherein the lower sealing member has a lower seal wall having an inner wall portion and an outer wall portion, a reinforcing layer being disposed intermediate the inner wall portion and the outer wall portion.

11. A valve seal according to claim 9 wherein the upper seal portion and the lower seal portion are integrally formed from the same material.

12. A valve seal according to claim 11 wherein the upper seal portion and the lower seal portion are formed from an elastomeric material.

13. A valve seal according to claim 12 wherein the elastomeric material is selected from the group consisting of silicone, plastic elastomers, polyisoprene, butyl rubber, neoprene and natural rubber.

14. A valve seal according to claim 9 wherein the generally frusto-conical lower sealing member has a lower seal wall terminating at the distal lower seal end, the lower seal wall being curved inward and defining a concave lower sealing member outer surface.

15. A valve seal according to claim 9 wherein the upper sealing member defines an access opening adjacent the mounting portion, the access opening being symmetrically formed around a bore axis, and wherein the valve seal is configured so that upon insertion of an instrument in an orientation not aligned with the bore axis, the distal lower seal end and the instrument seal opening will move radially relative to the bore axis and the access opening will remain substantially unmoved relative to the bore axis.

16. A valve seal for use in a surgical instrument seal assembly, the valve seal comprising:
an upper seal portion having a mounting portion and a generally frusto-conical upper sealing member having a first taper extending from the mounting portion, the upper sealing member defining an access opening adjacent

the mounting portion, the access opening being symmetrically formed around a bore axis; and

a lower seal portion extending from the upper seal portion, the lower seal portion being adapted to seal around a surgical instrument and having a lower seal wall that curves inward and downward from the upper seal portion and terminates in a distal lower seal end that defines an instrument seal opening,

wherein the valve seal is configured so that upon insertion of an instrument in an orientation not aligned with the bore axis, the distal lower seal end and the instrument seal opening will move radially relative to the bore axis and the access opening will remain substantially unmoved relative to the bore axis.